

**WHAT IS CLAIMED IS:**

1. A method of selecting an optimal color with respect to a background color  
5 using Munsell color-order system, the Munsell color-order system being represented in a  
three dimensional space around an achromatic axis in a vertical direction, the vertical  
direction representing a predetermined lightness range of lightness levels, a horizontal  
direction representing a predetermined saturation range of saturation levels, a  
circumference around the achromatic axis representing a predetermined hue range of hue  
10 levels, comprising:  
selecting a first point in the Munsell color-order system as a first color;  
selecting a second point in the Munsell color-order system as a second color at a  
predetermined relative distance from the first point, the first point and the second point  
forming a relative distance line, the second color being sufficiently distinctive in  
15 combination with the first color for desired human perception; and  
determining an optimal color range of colors from the second point in the  
Munsell color-order system, the second color being selected from the optimal color range.
2. The method of selecting an optimal color with respect to a background color  
20 according to claim 1 wherein the first point is off the achromatic axis, a first distance and a  
second distance being defined from the achromatic axis respectively to the first point and  
the second point, the first point and the second point forming a perpendicularly intersecting  
line that intersects the achromatic axis and is perpendicular to the achromatic axis.
- 25 3. The method of selecting an optimal color with respect to a background color  
according to claim 2 wherein the predetermined lightness range is from zero to ten, the  
perpendicularly intersecting line intersecting the achromatic axis at the lightness level of  
five, the first distance being longer than the second distance, the second point being  
selected at a point in the Munsell color-order system so that a ratio of the first distance over  
30 the second distance is equal to or more than four.

4. The method of selecting an optimal color with respect to a background color according to claim 2 wherein the predetermined lightness range is from zero to ten, the perpendicularly intersecting line intersecting the achromatic axis at the lightness level of five, the second distance being longer than the first distance, the second point being  
5 selected at a point in the Munsell color-order system so that a ratio of the first distance over the second distance is equal to or less than one-fourth.

5. The method of selecting an optimal color with respect to a background color according to claim 1 wherein an inter-point distance is defined between the first point and  
10 the second point, the first point and the second point forming a perpendicularly intersecting line that intersects the achromatic axis and is perpendicular to the achromatic axis.

6. The method of selecting an optimal color with respect to a background color according to claim 5 wherein the first point is on the achromatic axis while the second  
15 point is off the achromatic axis, the inter-point distance being at least four.

7. The method of selecting an optimal color with respect to a background color according to claim 5 wherein the first point is off the achromatic axis while the second  
20 point is on the achromatic axis, the inter-point distance being at least four.

8. The method of selecting an optimal color with respect to a background color according to claim 1 wherein an inter-point distance is defined between the first point and the second point, the first point and the second point forming a parallel line that is parallel  
25 to the achromatic axis, the inter-point distance being at least four.

9. The method of selecting an optimal color with respect to a background color according to claim 1 wherein the optimal color range is defined on a circular plane that is perpendicular to the relative distance line at the second point, the circular plane being  
30 defined by a radius from the second point, the radius being determined by a predetermined angle at the first point with respect to the relative distance line.

10. The method of selecting an optimal color with respect to a background color according to claim 9 wherein the predetermined angle is  $15^\circ$  for including at least two adjacent colors in the Munsell color-order system.

5 11. The method of selecting an optimal color with respect to a background color according to claim 1 further comprising an additional step of comparing the first color and the second color against predetermined pairs of undesirable color combinations.

10 12. The method of selecting an optimal color with respect to a background color according to claim 11 wherein the second color is not used for display based upon said comparing.

15 13. A memory medium storing a computer executable program for selecting an optimal color with respect to a background color using Munsell color-order system, the Munsell color-order system being represented in a three dimensional space around an achromatic axis in a vertical direction, the vertical direction representing a predetermined lightness range of lightness levels, a horizontal direction representing a predetermined saturation range of saturation levels, a circumference around the achromatic axis representing a predetermined hue range of hue levels, the executable program comprising the steps of:

20 selecting a first point in the Munsell color-order system as a first color;

selecting a second point in the Munsell color-order system as a second color at a predetermined relative distance from the first point, the first point and the second point forming a relative distance line, the second color being sufficiently distinctive in combination with the first color for desired human perception; and

25 determining an optimal color range of colors from the second point in the Munsell color-order system, the second color being selected from the optimal color range.

30 14. The memory medium storing a computer executable program according to claim 13 wherein the first point is off the achromatic axis, a first distance and a second distance being defined from the achromatic axis respectively to the first point and the

second point, the first point and the second point forming a perpendicularly intersecting line that intersects the achromatic axis and is perpendicular to the achromatic axis.

15        15. The memory medium storing a computer executable program according to  
claim 14 wherein the predetermined lightness range is from zero to ten, the perpendicularly  
intersecting line intersecting the achromatic axis at the lightness level of five, the first  
distance being longer than the second distance, the second point being selected at a point in  
the Munsell color-order system so that a ratio of the first distance over the second distance  
is equal to or more than four.

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16. The memory medium storing a computer executable program according to  
claim 14 wherein the predetermined lightness range is from zero to ten, the perpendicularly  
intersecting line intersecting the achromatic axis at the lightness level of five, the second  
distance being longer than the first distance, the second point being selected at a point in  
15 the Munsell color-order system so that a ratio of the first distance over the second distance  
is equal to or less than one-fourth.

17. The memory medium storing a computer executable program according to  
claim 13 wherein an inter-point distance is defined between the first point and the second  
point, the first point and the second point forming a perpendicularly intersecting line that  
20 intersects the achromatic axis and is perpendicular to the achromatic axis.

18. The memory medium storing a computer executable program according to  
claim 17 wherein the first point is on the achromatic axis while the second point is off the  
25 achromatic axis, the inter-point distance being at least four.

19. The memory medium storing a computer executable program according to  
claim 17 wherein the first point is off the achromatic axis while the second point is on the  
achromatic axis, the inter-point distance being at least four.

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20. The memory medium storing a computer executable program according to  
claim 13 wherein an inter-point distance is defined between the first point and the second

point, the first point and the second point forming a parallel line that is parallel to the achromatic axis, the inter-point distance being at least four.

21. The memory medium storing a computer executable program according to claim 13 wherein the optimal color range is defined on a circular plane that is perpendicular to the relative distance line at the second point, the circular plane being defined by a radius from the second point, the radius being determined by a predetermined angle at the first point with respect to the relative distance line.

22. The memory medium storing a computer executable program according to claim 21 wherein the predetermined angle is 15° for including at least two adjacent colors in the Munsell color-order system.

23. The memory medium storing a computer executable program according to claim 1 further comprising an additional step of comparing the first color and the second color against predetermined pairs of undesirable color combinations.

24. The memory medium storing a computer executable program according to claim 23 wherein the second color is not used for display based upon said comparing.

25. A system for selecting an optimal color with respect to a background color using Munsell color-order system, comprising:

a memory storage unit for storing data for representing the Munsell color-order system, the Munsell color-order system being represented in a three dimensional space around an achromatic axis in a vertical direction, the vertical direction representing a predetermined lightness range of lightness levels, a horizontal direction representing a predetermined saturation range of saturation levels, a circumference around the achromatic axis representing a predetermined hue range of hue levels;

a processing unit connected to said memory storage unit for selecting a first point as a first color and a second point in the Munsell color-order system as a second color at a predetermined relative distance from the first point, the first point and the second point forming a relative distance line, the second color being sufficiently distinctive in

combination with the first color for desired human perception, said processing unit also determining an optimal color range of colors from the second point in the Munsell color-order system, the second color being selected from the optimal color range; and

5 a display unit connected to said processing unit for displaying the second color against the first color.

26. The system for selecting an optimal color according to claim 25 wherein the first point is off the achromatic axis, a first distance and a second distance being defined from the achromatic axis respectively to the first point and the second point, the first point  
10 and the second point forming a perpendicularly intersecting line that intersects the achromatic axis and is perpendicular to the achromatic axis.

27. The system for selecting an optimal color according to claim 26 wherein the predetermined lightness range is from zero to ten, the perpendicularly intersecting line  
15 intersecting the achromatic axis at the lightness level of five, the first distance being longer than the second distance, said processing unit selecting the second point at a point in the Munsell color-order system so that a ratio of the first distance over the second distance is equal to or more than four.

28. The system for selecting an optimal color according to claim 26 wherein the predetermined lightness range is from zero to ten, the perpendicularly intersecting line  
20 intersecting the achromatic axis at the lightness level of five, the second distance being longer than the first distance, said processing unit selecting the second point at a point in the Munsell color-order system so that a ratio of the first distance over the second distance  
25 is equal to or less than one-fourth.

29. The system for selecting an optimal color according to claim 25 wherein an inter-point distance is defined between the first point and the second point, said processing unit selecting the second point so that the first point and the second point forms  
30 perpendicularly intersecting line that intersects the achromatic axis and is perpendicular to the achromatic axis.

30. The system for selecting an optimal color according to claim 29 wherein the first point is on the achromatic axis while the second point is off the achromatic axis, said processing unit selecting the second point so that the inter-point distance is at least four.

5           31. The system for selecting an optimal color according to claim 29 wherein the first point is off the achromatic axis while the second point is on the achromatic axis, said processing unit selecting the second point so that the inter-point distance is at least four.

10           32. The system for selecting an optimal color according to claim 25 wherein an inter-point distance is defined between the first point and the second point, said processing unit selecting the second point so that the first point and the second point forming a parallel line that is parallel to the achromatic axis and that the inter-point distance being at least four.

15           33. The system for selecting an optimal color according to claim 25 wherein said processing unit determines the optimal color range to be on a circular plane that is perpendicular to the relative distance line at the second point, the circular plane being defined by a radius from the second point, the radius being determined by a predetermined angle at the first point with respect to the relative distance line.

20           34. The system for selecting an optimal color according to claim 33 wherein the predetermined angle is  $15^\circ$  for including at least two adjacent colors in the Munsell color-order system.

25           35. The system for selecting an optimal color according to claim 25 wherein said memory storage unit stores predetermined pairs of undesirable color combinations, said processing unit comparing the first color and the second color against the predetermined pairs of the undesirable color combinations.

30           36. The system for selecting an optimal color according to claim 35 further comprising an input unit connected to said processing unit for inputting a user overruling signal for using the undesirable color combinations for display.

37. A method of selecting an optimal color with respect to a background color using Munsell color-order system, the Munsell color-order system being represented in a three dimensional space around an achromatic axis in a vertical direction, the vertical direction representing a predetermined lightness range of lightness levels, a horizontal direction representing a predetermined saturation range of saturation levels, a circumference around the achromatic axis representing a predetermined hue range of hue levels, comprising:

selecting a first point in the Munsell color-order system as a first color;

selecting a second point in the Munsell color-order system as a second color at a predetermined relative distance from the first point, the first point and the second point forming a relative distance line, the second color being sufficiently distinctive in combination with the first color for desired human perception, the first point is off the achromatic axis, a first distance and a second distance being defined from the achromatic axis respectively to the first point and the second point, the first point and the second point forming a perpendicularly intersecting line that intersects the achromatic axis and is perpendicular to the achromatic axis, the predetermined lightness range is from zero to ten, the perpendicularly intersecting line intersecting the achromatic axis at the lightness level of five, the second distance being longer than the first distance, the second point being selected at a point in the Munsell color-order system so that a ratio of the first distance over the second distance is equal to or less than one-fourth; and

determining an optimal color range of colors from the second point in the Munsell color-order system, the second color being selected from the optimal color range.

38. A method of selecting an optimal color with respect to a background color using Munsell color-order system, the Munsell color-order system being represented in a three dimensional space around an achromatic axis in a vertical direction, the vertical direction representing a predetermined lightness range of lightness levels, a horizontal direction representing a predetermined saturation range of saturation levels, a circumference around the achromatic axis representing a predetermined hue range of hue levels, comprising:

selecting a first point in the Munsell color-order system as a first color;



selecting a second point in the Munsell color-order system as a second color at a predetermined relative distance from the first point, the first point and the second point forming a relative distance line, the second color being sufficiently distinctive in combination with the first color for desired human perception, the first point is off the achromatic axis, a first distance and a second distance being defined from the achromatic axis respectively to the first point and the second point, the first point and the second point forming a perpendicularly intersecting line that intersects the achromatic axis and is perpendicular to the achromatic axis, the predetermined lightness range is from zero to ten, the perpendicularly intersecting line intersecting the achromatic axis at the lightness level of five, the first distance being longer than the second distance, the second point being selected at a point in the Munsell color-order system so that a ratio of the first distance over the second distance is equal to or more than four; and

determining an optimal color range of colors from the second point in the Munsell color-order system, the second color being selected from the optimal color range.

39. A method of selecting an optimal color with respect to a background color using Munsell color-order system, the Munsell color-order system being represented in a three dimensional space around an achromatic axis in a vertical direction, the vertical direction representing a predetermined lightness range of lightness levels, a horizontal direction representing a predetermined saturation range of saturation levels, a circumference around the achromatic axis representing a predetermined hue range of hue levels, comprising:

selecting a first point in the Munsell color-order system as a first color;

selecting a second point in the Munsell color-order system as a second color at a predetermined relative distance from the first point, the first point and the second point forming a relative distance line, the second color being sufficiently distinctive in combination with the first color for desired human perception, an inter-point distance is defined between the first point and the second point, the first point and the second point forming a parallel line that is parallel to the achromatic axis, the inter-point distance being at least four; and

determining an optimal color range of colors from the second point in the Munsell color-order system, the second color being selected from the optimal color range.

40. A method of selecting an optimal color with respect to a background color using Munsell color-order system, the Munsell color-order system being represented in a three dimensional space around an achromatic axis in a vertical direction, the vertical direction representing a predetermined lightness range of lightness levels, a horizontal direction representing a predetermined saturation range of saturation levels, a circumference around the achromatic axis representing a predetermined hue range of hue levels, comprising:

selecting a first point in the Munsell color-order system as a first color;

selecting a second point in the Munsell color-order system as a second color at a predetermined relative distance from the first point, the first point and the second point forming a relative distance line, the second color being sufficiently distinctive in combination with the first color for desired human perception, an inter-point distance is defined between the first point and the second point, the first point and the second point forming a perpendicular line that is perpendicular to the achromatic axis, the inter-point distance being at least four; and

determining an optimal color range of colors from the second point in the Munsell color-order system, the second color being selected from the optimal color range.

41. A system for selecting an optimal color with respect to a background color using Munsell color-order system, comprising:

a memory storage unit for storing data for representing the Munsell color-order system, the Munsell color-order system being represented in a three dimensional space around an achromatic axis in a vertical direction, the vertical direction representing a predetermined lightness range of lightness levels, a horizontal direction representing a predetermined saturation range of saturation levels, a circumference around the achromatic axis representing a predetermined hue range of hue levels;

a processing unit connected to said memory storage unit for selecting a first point as a first color and a second point in the Munsell color-order system as a second color at a predetermined relative distance from the first point, the first point and the second point forming a relative distance line, the second color being sufficiently distinctive in combination with the first color for desired human perception, the first point is off the

achromatic axis, a first distance and a second distance being defined from the achromatic axis respectively to the first point and the second point, the first point and the second point forming a perpendicularly intersecting line that intersects the achromatic axis and is perpendicular to the achromatic axis, the predetermined lightness range is from zero to ten, the perpendicularly intersecting line intersecting the achromatic axis at the lightness level of five, the first distance being longer than the second distance, said processing unit selecting the second point at a point in the Munsell color-order system so that a ratio of the first distance over the second distance is equal to or more than four, said processing unit also determining an optimal color range of colors from the second point in the Munsell color-order system, the second color being selected from the optimal color range; and a display unit connected to said processing unit for displaying the second color against the first color.

42. A system for selecting an optimal color with respect to a background color using Munsell color-order system, comprising:

a memory storage unit for storing data for representing the Munsell color-order system, the Munsell color-order system being represented in a three dimensional space around an achromatic axis in a vertical direction, the vertical direction representing a predetermined lightness range of lightness levels, a horizontal direction representing a predetermined saturation range of saturation levels, a circumference around the achromatic axis representing a predetermined hue range of hue levels;

a processing unit connected to said memory storage unit for selecting a first point as a first color and a second point in the Munsell color-order system as a second color at a predetermined relative distance from the first point, the first point and the second point forming a relative distance line, the second color being sufficiently distinctive in combination with the first color for desired human perception, the first point is off the achromatic axis, a first distance and a second distance being defined from the achromatic axis respectively to the first point and the second point, the first point and the second point forming a perpendicularly intersecting line that intersects the achromatic axis and is perpendicular to the achromatic axis, the predetermined lightness range is from zero to ten, the perpendicularly intersecting line intersecting the achromatic axis at the lightness level of five, the second distance being longer than the first distance, said processing unit

selecting the second point at a point in the Munsell color-order system so that a ratio of the first distance over the second distance is equal to or less than one-fourth, said processing unit also determining an optimal color range of colors from the second point in the Munsell color-order system, the second color being selected from the optimal color range; and

5           a display unit connected to said processing unit for displaying the second color against the first color.

43. A system for selecting an optimal color with respect to a background color using Munsell color-order system, comprising:

10           a memory storage unit for storing data for representing the Munsell color-order system, the Munsell color-order system being represented in a three dimensional space around an achromatic axis in a vertical direction, the vertical direction representing a predetermined lightness range of lightness levels, a horizontal direction representing a predetermined saturation range of saturation levels, a circumference around the achromatic  
15           axis representing a predetermined hue range of hue levels;

          a processing unit connected to said memory storage unit for selecting a first point as a first color and a second point in the Munsell color-order system as a second color at a predetermined relative distance from the first point, the first point and the second point forming a relative distance line, the second color being sufficiently distinctive in  
20           combination with the first color for desired human perception, an inter-point distance is defined between the first point and the second point, said processing unit selecting the second point so that the first point and the second point forming a parallel line that is parallel to the achromatic axis and that the inter-point distance being at least four, said processing unit also determining an optimal color range of colors from the second  
25           point in the Munsell color-order system, the second color being selected from the optimal color range; and

          a display unit connected to said processing unit for displaying the second color against the first color.

30           44. A system for selecting an optimal color with respect to a background color using Munsell color-order system, comprising:

a memory storage unit for storing data for representing the Munsell color-order system, the Munsell color-order system being represented in a three dimensional space around an achromatic axis in a vertical direction, the vertical direction representing a predetermined lightness range of lightness levels, a horizontal direction representing a predetermined saturation range of saturation levels, a circumference around the achromatic axis representing a predetermined hue range of hue levels;

a processing unit connected to said memory storage unit for selecting a first point as a first color and a second point in the Munsell color-order system as a second color at a predetermined relative distance from the first point, the first point and the second point forming a relative distance line, the second color being sufficiently distinctive in combination with the first color for desired human perception, an inter-point distance is defined between the first point and the second point, said processing unit selecting the second point so that the first point and the second point forming a perpendicular line that is perpendicular to the achromatic axis and that the inter-point distance being at least four, said processing unit also determining an optimal color range of colors from the second point in the Munsell color-order system, the second color being selected from the optimal color range; and

a display unit connected to said processing unit for displaying the second color against the first color.